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WALTER M. DICKIE, M.D., Director

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# *The Typhoid Fever Carrier Problem**

By Dr. H. L. Wynns, San Francisco, Chief, Bureau of Epidemiology,
California State Department of Public Health

All present at this meeting are well acquainted with the marked decline in the typhoid fever rates throughout the United States since the latter part of the last century. This decline was initiated largely by the general improvement in the public water supplies. Beginning about 1910 much of the decline can be attributed to improvement in sanitation in general, and especially to improvement in milk supplies with the advent of pasteurization.

Today, the greater part of the general public may be said to live in a very sanitary environment having a safe public water supply, adequate sewage disposal system, good milk supply, and eating food produced under good hygienic conditions, yet we still have an appreciable incidence of typhoid fever.

Comparatively few of our cases today can be traced to an epidemic, either water borne or milk borne; they are largely sporadic cases. Thus it is apparent that correction of polluted water and milk supplies and other defective environmental factors are not sufficient to control typhoid and that other factors operate to produce our residual typhoid fever rate. Most of these sporadic cases can be attribtued directly to the casual typhoid carrier. Thus the individual carrier has come into greater and greater prominence and of necessity should occupy an important place in the typhoid fever control program.

It has been estimated by various authorities that from 2 to 4 per cent of all individuals recovering from typhoid fever become chronic carriers. In 1936 we had 596 reported cases of typhoid fever. Thus during the year we undoubtedly added from 12 to 20 new carriers to our general population.

Carriers may be classified according to the channels of elimination into three classes:

1. Intestinal or fecal,
2. Urinary,
3. Pus carriers.

The majority of carriers are intestinal. The gall bladder is usually the seat of the infection with possible spread of the process upwards in the biliary ducts. Occasionally the appendix has been found to harbor typhoid bacilli but in all instances so recorded typhoid bacilli were also demonstrated in the biliary tract.

The pelvis of the kidney is the most common focus in the urinary carriers. They are relatively rare in comparison to fecal carriers (and are apparently less dangerous as most outbreaks of typhoid traced to carriers turn out to be individuals who discharge typhoid bacilli in the feces rather than in the urine).

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* Read at annual meeting of Health Officers' Section, League of California Municipalities, San Jose, September 14, 1937.
Numbered reference notes at end of article.

The third class—pus carriers—can be considered of relative little importance as sources of infection. (The bacilli are usually present in a chronic abscess, otitis media, or periostitis.)

Carriers are commonly classified in reference to their relation to typhoid fever, namely,

Convalescent carriers,
Chronic carriers,
Passive carriers—or casual carriers.

Convalescent carriers are those cases of typhoid fever who continue to discharge typhoid bacilli up to one year following clinical recovery. Many of these spontaneously clear up sometime within the period known as the convalescent carrier stage.

Chronic carriers are those who continue to discharge typhoid bacilli after a period of one year following clinical recovery. There is a preponderance of evidence that those discharging bacilli after one year continue to remain carriers throughout their natural lives.

Passive or casual carriers are chronic carriers who are found harboring bacilli and give either a history of typhoid fever at some time in the past or who give no history of a typhoid attack whatever. (In New York state [1] 20 per cent of those carriers found (exclusive of those found through follow-up of cases) gave no history of clinical typhoid fever.) In our series 29 per cent give no history suggestive of typhoid fever.

We have 233 chronic carriers on our records in this state. Of this number some have died or left the state. By years, these cases were discovered as follows:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1912 | 1 | 1920 | 3 | 1926 | 7 | 1932 | 17 |
| 1914 | 1 | 1921 | 1 | 1927 | 12 | 1933 | 12 |
| 1916 | 2 | 1922 | 2 | 1928 | 12 | 1934 | 11 |
| 1917 | 9 | 1923 | 3 | 1929 | 8 | 1935 | 12 |
| 1918 | 5 | 1924 | 42 | 1930 | 9 | 1936 | 28 |
| 1919 | 1 | 1925 | 5 | 1931 | 22 | 1937 | 8 |
| Total to date | | | | | | | 233 |

By age distribution:

| | | |
|---|---|---|
| 0– 9 years | 6 | 8.6 per cent |
| 10–19 years | 14 | |
| 20–29 years | 17 | 42.9 per cent |
| 30–39 years | 35 | |
| 40–49 years | 48 | |
| 50–59 years | 33 | 30.1 per cent |
| 60–69 years | 17 | |
| 70 plus | 20 | |
| Adult | 43 | 18.4 per cent |
| | 233 | |

By sex:

| | | |
|---|---|---|
| Males | 96 | 41.2 per cent |
| Females | 137 | 58.8 per cent |

In 86 of ours giving a definite history of having had typhoid the length of time between their having had typhoid fever and the time they were first discovered was:

| | | |
|---|---|---|
| 0– 4 years | 17 | |
| 5– 9 years | 13 | |
| 10–14 years | 7 | |
| 15–19 years | 14 | |
| 20–29 years | 15 | 40.7 per cent had had an interval of 20 years or more |
| 30–39 years | 8 | |
| 40–49 years | 4 | |
| 50–59 years | 4 | |
| 60 and over | | |

(In New York state they found that 39.2 per cent of a series of 287 had had their attack of typhoid fever 20 years or more.)[2]

There are several methods for the detection of carriers: 1. Epidemiological investigation. 2. Release specimens from all clinical cases. 3. Routine food handler examinations.

(Naturally the health officer is interested in doing that which produces the most good in comparison to the effort expended.)

In New York City during the period 1915 to 1935 a total of 565 carriers have been discovered.[3] Fifty-two and seven-tenths per cent (or 308 of these) were discovered by means of epidemiological investigation; 42 per cent (or 227) by means of release cultures, and 5.3 per cent (or 30) by means of routine food handler examinations. It will be of interest to mention that those 30 carriers detected represent three and one-half million routine food handler examinations—or one carrier for every 100,000 examined. On the basis of these findings the city board of health rescinded that section of the sanitary code requiring yearly health examination of food handlers.

In New York state (exclusive of New York City) up to January 1, 1936, 570 carriers have been found.[1] Of these 72.4 per cent (or 370) were found by epidemiological investigation; (101 or) 19.8 per cent by release specimens; 2.5 per cent (or 13) by routine food handler examination; 5.3 per cent (or 27) by accidental means. During the period 1911 to 1928 before release cultures were uniformly taken there were 39,074 cases of typhoid fever and 39 or 0.1 per cent carriers were found, while during the period 1929–1934 there were only 2704 cases while 61, or 2.3 per cent, were found to be carriers.

In Connecticut [4] by means of 91,257 food handler examinations 71 carriers were found at an average estimated cost of $677 per carrier found. (In New Mexico [5] 20 carriers were found by the examination of 7040 food handlers.)

It has generally been concluded that routine food handler examination is of value only principally on raw milk dairys and in institutions. (So that the methods producing the best results are epidemiological investigations of each case and release cultures on recovering cases.)

Epidemiological investigations to be of any value must be carefully taken by an interested and well trained individual. (No lead no matter how small should be overlooked.) As a considerable percentage of cases acquire their infection right within their own family all household contact should be required to submit stool and urine specimens whether they give a history of typhoid or not. All food handlers suspected should also be required to submit specimens: Specimens should be collected under supervision if it seems necessary. All specimens should be examined in an approved laboratory.

The taking of release specimens from recovered cases while it is often an irksome procedure to the attending physician and health officer alike, is, as I have previously pointed out, an important procedure in the control of typhoid fever. The state regulations require two successive negative specimens examined in approved laboratories, taken after clinical recovery and not less than a week or more than a month apart. From food handlers the health officer should require additional specimens and these under supervision.

(Continued in next issue)

## COORDINATION OF PUBLIC HEALTH NURSING ACTIVITIES

(Continued from last issue)

The number of home visits a nurse can make each day will depend upon the other activities included in the program. Where the full day is devoted to home visits, the total number of effective visits which a nurse can make will average approximately thirteen, allowing the rest of the time for related activities. If a nurse is obliged to make from twenty to thirty calls a day, it is obvious that she will have little or no time for health teaching in the homes and public health nursing is effective only when the nurses have the ability and are allowed time for health teaching.

If a study shows that the total volume of work needed in a community exceeds the amount of work which the nurses on the staff can carry, a decision must be made as to what shall be omitted and how the available nurse power is to be distributed. If such a study shows that the time of eight nurses is required to carry out the program in a health department which has only four nurses, some adjustment will obviously be required. A time study covering two or three months in the year to determine the activities on which the nurse's time is being spent and the amount of time devoted to each type of work, is a worth while undertaking for a health department.

The standards set up by the appraisal form attempt to provide only a quantitative measure of public health activities. However, there is reason to believe that the evaluation of public health nursing work from this standpoint will stimulate consideration of the *quality* of public health nursing activities. If quantity is over-emphasized, quality will inevitably suffer.

Along with the setting up of standards for the public health nurse's work and the determination of the volume of work which she can be expected to do efficiently, should go the important activity of program planning for the entire year, for each month and week and finally for each day. The fact that emergencies come to disturb the best laid plans does not appear to constitute an adequate reason for not planning.

In the pressure of planning and carrying out her responsibilities, the public health nurse may tend to think of the health department chiefly in terms of public health nursing activities. It is important for her work and for that of the entire department that she be informed of the activities of other divisions and that there be as close cooperation as possible with all divisions.

In his book on Community Health Organization, Prof. Ira V. Hiscock, says:

> "The public health campaign of the present day is becoming more and more clearly an educational movement dominated by the motive of improving the hygienic conduct of the individual life with the aid of preventive advisory medical service. In teaching the individual the principles of healthful living and in bringing the individual into timely contact with the medical resources of the community, the public health nurse has proved herself the most useful agent at our disposal and the program of modern public health work in a given community may be measured by the extent to which public health nursing has been developed."

In her daily activities, the public health nurse assists the physician at conferences, clinics and in school examinations. In addition, she serves every member of the family in the home through the programs of the health department in prenatal, infant, preschool and school activities, and through communicable disease, venereal disease and tuberculosis control activities. She is, in the final analysis, the coordinator of many of the varied services of the health department in relation to the homes in the community which she serves.

## MUSSEL QUARANTINE EXTENDED

Because of continued high toxicity of mussels as determined by laboratory examination, the quarantine on mussels established by the State Board of Public Health, May 26, 1937, has been extended by order of Dr. W. M. Dickie, Director of the State Department of Public Health, to October 30, 1937.

The original order terminated the quarantine on September 30, but, because of unusual conditions encountered, it has been necessary to continue the quarantine through another month. Under the provisions of the order, the sale or offering for sale of mussels taken from the ocean shore of California, from the southern boundary of Los Angeles County to the Oregon state line, with the exception of the bay of San Francisco, is prohibited.

## MORBIDITY

### Complete Reports for Following Diseases for Week Ending October 2, 1937

**Chickenpox**

99 cases: Alameda 1, Berkeley 3, Oakland 9, San Leandro 8, Arcata 1, Lassen County 2, Susanville 1, Los Angeles County 5, Los Angeles 4, South Pasadena 1, Madera County 1, San Anselmo 1, Orange County 2, Sacramento 1, San Diego 2, San Francisco 23, San Joaquin County 3, Lodi 1, Stockton 2, San Luis Obispo County 4, San Luis Obispo 1, Menlo Park 1, Santa Barbara County 4, Santa Cruz County 4, Modesto 2, Exeter 1, Lindsay 1, Ventura County 2, Oxnard 3, Ventura 1, Yuba County 4.

**Diphtheria**

16 cases: Berkeley 1, Oakland 1, Contra Costa County 1, Los Angeles County 2, Los Angeles 5, South Gate 1, San Bernardino County 1, San Diego 1, Yuba City 1, Tehama County 1, Tulare County 1.

**German Measles**

20 cases: Berkeley 3, Oakland 1, Covina 1, Long Beach 1, Los Angeles 6, San Fernando 1, Lynwood 1, South Gate 1, Orange County 1, San Francisco 2, Oakdale 1, Pomona 1.

**Influenza**

16 cases: Long Beach 1, Los Angeles 5, Orange County 2, Anaheim, 1, La Habra 1, San Francisco 1, San Luis Obispo 2, Daly City 3.

**Malaria**

11 cases: Jackson 1, Los Angeles 2, Merced County 1, Modesto 1, Tulare County 4, Marysville 1, California 1.*

**Measles**

19 cases: Alameda County 1, Fresno County 1, Kern County 1, Los Angeles County 2, Glendale 1, Long Beach 1, Los Angeles 8, South Pasadena 1, San Francisco 1, Turlock 1, Yuba City 1.

**Mumps**

113 cases: Alameda County 1, Alameda 2, Berkeley 4, Oakland 2, Fresno 2, Kern County 1, Los Angeles County 8, Alhambra 2, El Segundo 1, Glendale 1, Inglewood 1, Long Beach 2, Los Angeles 16, Santa Monica 6, South Pasadena 1, Whittier 1, Lynwood 1, Madera 1, Marin County 1, San Anselmo 1, Monterey 1, Calistoga 1, Napa 1, Brea 1, Fullerton 3, Riverside County 1, Sacramento 1, Redlands 3, San Diego County 3, San Diego 6, San Francisco 28, San Joaquin County 1, Santa Barbara County 1, Santa Barbara 2, Lompoc 1, Santa Maria 1, Palo Alto 2, Tehama County 1.

**Pneumonia (Lobar)**

27 cases: Oakland 1, Fresno 1, Los Angeles County 2, Los Angeles 13, San Gabriel 1, Sierra Madre 1, San Diego 1, San Francisco 4, Paso Robles 1, Tulare County 2.

**Scarlet Fever**

122 cases: Alameda County 1, Oakland 4, San Leandro 1, Amador County 3, Contra Costa County 9, Pittsburg 1, Fresno County 1, Bakersfield 1, Lassen County 7, Susanville 3, Los Angeles County 12, Alhambra 1, El Monte 1, Glendale 1, Long Beach 2, Los Angeles 16, Santa Monica 1, Bell 1, Madera 2, Pacific Grove 1, Orange County 6, Fullerton 2, Riverside County 1, Riverside 2, Sacramento 1, Ontario 1, San Diego 2, San Francisco 4, San Joaquin County 1, Lodi 4, Stockton 5, San Bruno 3, San Carlos 1, Santa Barbara County 1, Lompoc 3, Santa Barbara 5, Santa Clara County 1, Mountain View 1, Vacaville 1, Tulare County 1, Lindsay 2, Porterville 1, Ventura County 1, Oxnard 1, Santa Paula 1, Yolo County 1.

**Smallpox**

One case: Tuolumne County 1.

**Typhoid Fever**

12 cases: Gridley 1, Lassen County 1, Los Angeles 3, Ukiah 1, Merced County 1, Turlock 1, Tulare County 3, California 1.*

**Whooping Cough**

225 cases: Berkeley 7, Oakland 8, Contra Costa County 2, Fresno County 3, Fresno 1, Humboldt County 3, Inyo County 3, Kern County 3, Los Angeles County 25, Alhambra 1, Azusa 1, El Monte 1, Glendale 2, Huntington Park 1, Long Beach 6, Los Angeles 37, Pasadena 1, Redondo 2, San Fernando 1, Whittier 3, Torrance 2, Hawthorne 2, South Gate 2, Madera County 4, Merced County 1, Monterey County 2, Monterey 1, Pacific Grove 1, Nevada County 2, Orange County 4, Brea 3, Fullerton 1, Orange 1, Santa Ana 4, Laguna Beach 1, Riverside 5, Sacramento 3, San Bernardino County 1, Redlands 1, San Bernardino 3, National City 3, Oceanside 1, San Diego 1, San Francisco 36, San Joaquin County 4, Stockton 7, San Bruno 2, San Mateo 1, Santa Clara County 1, Palo Alto 6, Santa Cruz County 1, Modesto 2, Ventura County 1, Yuba County 4.

**Meningitis (Epidemic)**

One case: Yuba County.

**Dysentery (Amoebic)**

Two cases: Los Angeles 1, Ontario 1.

**Dysentery (Bacillary)**

15 cases: Los Angeles County 2, Los Angeles 6, San Fernando 1, Anaheim 1, San Francisco 3, San Mateo 2.

**Pellagra**

Two cases: Los Angeles 1, Santa Ana 1.

**Poliomyelitis**

32 cases: Calaveras County 1, Contra Costa County 1, Bishop 1, Kern County 5, Hanford 1, Los Angeles County 3, Long Beach 1, Los Angeles 2, Sacramento County 1, Sacramento 1, Needles 1, Chula Vista 1, San Diego 3, San Francisco 1, San Joaquin County 1, Burlingame 1, Sonoma County 1, Santa Rosa 1, Stanislaus County 1, Oakdale 1, Sutter County 1, Tulare County 2.

**Tetanus**

Four cases: Oakland 1, Los Angeles County 2, Los Angeles 1.

**Trachoma**

Eight cases: Los Angeles 1, San Diego County 6, Stockton 1.

**Encephalitis (Epidemic)**

Two cases: Placer County 1, Palo Alto 1.

**Paratyphoid Fever**

Two cases: Los Angeles 1, Modesto 1.

**Trichinosis**

Three cases: Santa Clara County 1, Palo Alto 2.

**Food Poisoning**

Eight cases: Alameda County 5, San Francisco 3.

**Undulant Fever**

Seven cases: Kern County 1, Los Angeles County 2, Los Angeles 2, Montebello 1, West Covina 1.

**Coccidioidal Granuloma**

One case: California.*

**Septic Sore Throat**

One case: Tulare County.

**Relapsing Fever**

2 cases: Inyo County 1, Placer County 1.

**Rabies (Animal)**

35 cases: Berkeley 3, Fresno 1, Kern County 1, Los Angeles County 5, Alhambra 4, Glendale 1, Inglewood 1, Los Angeles 11, Monterey Park 2, Gardena 1, Monterey County 1, Orange County 1, Newport Beach 1, Orange 1, Santa Cruz County 1.

Fire is latent within each of us, but it takes the right spark to make it flame. Coming to know some of the best members of our race, we learn how to think and how to live.

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* Cases charged to "California" represent patients ill before entering the state or those who contracted their illness traveling about the state throughout the incubaion period of the disease. These cases are not chargeable to any one locality.

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